



COURSE OUTLINE

1. **Course:** PHYS 271, How Things Work - Winter 2019

Lecture 01: MWF 10:00 - 10:50 in ICT 116

Instructor	Email	Phone	Office	Hours
Michael Wieser	mwieser@ucalgary.ca	403 220-3641	SB 131	R 11:00 - 13:00

Course Site:

D2L: PHYS 271 L01-(Winter 2019)-How Things Work

Note: Students must use their U of C account for all course correspondence.

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Component(s)	Weighting %	Date
Assignments	20	
Quizzes	30	
Presentations	30	
Term Paper	20	

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	95 %	90 %	85 %	80%	75%	70 %	65 %	60%	55%	50 %	45 %

4. **Missed Components Of Term Work:**

In the event that a student misses the midterm or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration will be required (see [Section N.1](#); for more information regarding the use of statutory declaration/medical notes, see [FAQ](#)). Absences must be reported within 48 hrs.

The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize themselves with these regulations. See also [Section E.3](#) of the University Calendar.

5. **Scheduled Out-of-Class Activities:**

There are no scheduled out of class activities for this course.

6. **Course Materials:**

Required Textbook(s):

Louis A. Bloomfield, *How Things Work 6th Edition*. Wiley.

7. **Examination Policy:**

There are no examinations in this course.

Students should also read the Calendar, [Section G](#), on Examinations.

8. **Approved Mandatory And Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course.

9. **Writing Across The Curriculum Statement:**

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also [Section E.2](#) of the University Calendar.

10. **Human Studies Statement:**

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

11. **Reappraisal Of Grades:**

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **15 days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a re-assessment of the work if, and only if, the student has sufficient academic grounds. See sections [I.1](#) and [I.2](#) of the University Calendar
- b. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

12. **Other Important Information For Students:**

- a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).
- b. **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see www.ucalgary.ca/wellnesscentre or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla

Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at [403-220-2208](tel:403-220-2208) .

- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples.**
- e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- f. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Physics & Astronomy, Dr. David Feder by email phas.ahugrd@ucalgary.ca or phone 403-220-8127. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.
- g. **Safewalk:** Campus Security will escort individuals day or night (See the [Campus Safewalk](#) website). Call [403-220-5333](tel:403-220-5333) for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- h. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.
- i. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: suvpaca@ucalgary.ca.
- j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.
- k. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- l. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or [non-academic misconduct](#), in addition to any other remedies available at law.

Assignments:

There will be approximately nine assignments over the course of the term constituting 20% of the final grade. Assignments are completed using WileyPLUS. The WileyPLUS system is free to access if you are using a campus computer (for example at the Taylor Digital Library). This will NOT give you access to the on-line textbook. If you wish to also have access to an e-text, then you can purchase WileyPLUS + textbook as a bundle. Instructions for accessing WileyPLUS can be found on the course D2L page. The assignments are all multiple choice. You are expected to work on assignments on your own. You can keep returning to the assignment as long as it is posted, and it will remember your previous responses, which can be changed up until the due date. Assignments will not be accessible after the due date.

Quizzes:

At the beginning and end of almost every class, you will answer a short quiz that explores your understanding of one or more concepts to be explored in that class. The mark breakdown for this 30% component is as follows. Pre-quizzes will add to 10% (5% participation and 5% response accuracy), post-quizzes will add to 20% (5% participation, 15% accuracy). The quizzes are all performed using the TopHat classroom response system. You must bring an electronic device (mobile phone, smart phone, tablet, laptop computer, etc.) to class in order to take the quizzes.

Group Work:

You will be assigned to a group of five students. You can find your group membership information on the D2L page. You will conduct all in-class activities with this group. I have attempted to strike a balance of students at different stages of their academic life, and I expect that you will work together with your group members in a respectful and engaging manner. Changing groups is possible, but only with permission by both parties and approval by me. Please note that your ability to answer the post-quiz will depend on how actively you participate in in-class group activities and understand what you are observing.

Presentations:

You will be working with a group of four students on two different projects, each worth 15% of the total course grade. The presentations will take place in the Taylor Institute in the TI Forum. The first will cover a special topic for a mechanical system (February 25, 27, March 1 - Five presentations per lecture), the second for a thermodynamic, electric, or electronic device (April 8, 10, 12 - Five presentations per lecture). Each project will consist of analyzing a natural phenomenon or a human-built system and presenting a description. The topics should be identified early in consultation with the instructor. You can think of the group projects as being effectively in lieu of your midterm and final exams. The presentations will be peer-evaluated by other students and likewise you will be evaluating other students' work. Your project grades will be an amalgamation of your peer and instructor assessments. You may choose your group members if you prefer; if you have no preference then I will choose the makeup of your group.

Term paper:

The term paper is worth 20% of the final grade. The topic will correspond to the system presented in the second (final) presentation. As this is a group-work term paper, students are responsible for dividing the work among the team members. One suggestion is that each student takes ownership of a particular section. This paper should take the form of a scientific paper. Pay attention to sentence structure, grammar, and spelling; this is your opportunity to express yourself clearly. Marks will be deducted for writing errors, so proofread your paper carefully (or have a friend help you!).

Lecture Topics (Tentative Schedule - Specific Readings will be assigned on D2L)

I. Chapter 1: The Laws of Motion, Part 1

Key Concepts:

- i. Inertia
- ii. direction of motion, velocity, acceleration
- iii. uniform and non-uniform motion
- iv. velocity in rotational motion
- v. Newton's 2nd law: force and acceleration
- vi. gravitational acceleration
- vii. Newton's 3rd law: action and reaction forces
- viii. kinetic energy and potential energy
- ix. work and its relation to force
- x. terminal velocity

Applications: skating, falling objects, ramps, pulleys, projectiles

II. Chapter 2: The Laws of Motion, Part 2

Key Concepts:

- i. center of mass
- ii. torque
- iii. rotational motion

- iv. rotational mass
- v. moment of inertia
- vi. friction: static, kinetic, and rotational
- vii. energy
- viii. thermal energy
- ix. momentum and its relation to force
 - x. angular momentum
- xi. conservation laws
 - Applications: seesaws (teeter-totters), balance scales, levers (i.e. crowbars), wind/water mills, pliers, tires, bumper cars

III. Chapter 3: Mechanical Objects, Part 1

Key Concepts:

- i. Springs
- ii. Elastic collisions
- iii. Inelastic collisions
- iv. Impulse
 - v. Relative velocity
- vi. Apparent weight
- vii. Rotational motion
 - Applications: spring scales, running shoes, bouncing balls, elevators, amusement rides, salad spinner, snowboarding (half-pipe)

IV. Chapter 4: Mechanical Objects, Part 2

Key Concepts:

- i. Torque
- ii. Static / dynamic equilibrium
- iii. Stable / unstable equilibrium
- iv. Celestial bodies: moon, earth
 - v. Escape velocity
- Applications: bicycles, hears, tides, rockets and space travel, satellites

V. Chapter 7: Heat and Phase Transitions

Key Concepts:

- i. Heat
- ii. Temperature
- iii. Thermal conductivity
- iv. Convection
 - v. Radiation
- vi. Sublimation
- vii. Evaporation
- viii. Phase transitions
 - ix. Blackbody absorption / radiation
 - x. Thermal expansion / contraction
- Applications: thermometers, cooking, construction, ocean and air currents, global warming, clothing, insulation, clothes, phases of water

VI. Chapter 8: Thermodynamics

Key Concepts:

- i. Entropy and relation to heat
- ii. Thermodynamic equilibrium
- iii. 0th Law of thermodynamics: spontaneous flow of heat
- iv. 1st Law of thermodynamics: conservation of energy
 - v. 2nd Law of thermodynamics: entropy always increases toward equilibrium
- vi. 3rd law of thermodynamics: entropy minimum at zero temperature
 - Applications: engines, automobiles, refrigerators, air conditioners, furnaces, heat pumps

VII. Chapter 9: Resonance and Mechanical Waves

Key Concepts:

- i. Pendulums
- ii. Harmonic motion
- iii. Strings: tension
- iv. Waves and vibrations
- v. Stationary and traveling waves
- vi. Longitudinal and transverse waves
- vii. Sound
- viii. Nodes and antinodes
- ix. Interference
- x. Resonance
- xi. Frequency and wavelength
- xii. Material properties
- xiii. Reflection and refraction

Applications: clocks, musical instruments, earthquakes, water waves

VIII. Chapter 12: Electromagnetic Waves

Key Concepts:

- i. Electric and magnetic fields
- ii. Electromagnetic waves
- iii. Spectrum of light
- iv. Frequency and wavelength
- v. Radio: AM and FM
- vi. polarization

Applications: antennae, electronics, radios, microwave ovens

IX. Chapter 13: Light

Key Concepts:

- i. Molecular absorption and emission of light
- ii. Quantum transitions
- iii. Light scattering
- iv. Reflection and refraction
- v. Interference
- vi. Polarization
- vii. Color: additive
- viii. Color: subtractive
- ix. Fluorescence
- x. Coherent and incoherent light
- xi. lasers

Applications: sunlight, why is the sky blue, why are sunsets red, oil slicks, different kinds of lights, LEDs, lasers

Course Outcomes:

- Knowledge of Concepts and Theories
- Critical Thinking
- Research and Problem Solving
- Communication
- Self-directed Learning
- Collaboration

Department Approval:

Electronically Approved

Date: 2019-01-08 09:29

Associate Dean's Approval for out of
regular class-time activity:

Electronically Approved

Date: 2019-01-08 16:55